Tribal Update
East Waterway Sediment Cleanup

Presented by the East Waterway Group:

- Port of Seattle
- King County
- City of Seattle

April 29, 2020

Objectives

1. Feasibility Study overview
   - Context for discussions
2. Recent EWG engagements with EPA
3. The natural background conundrum

Preliminary Remediation Goals (PRGs)

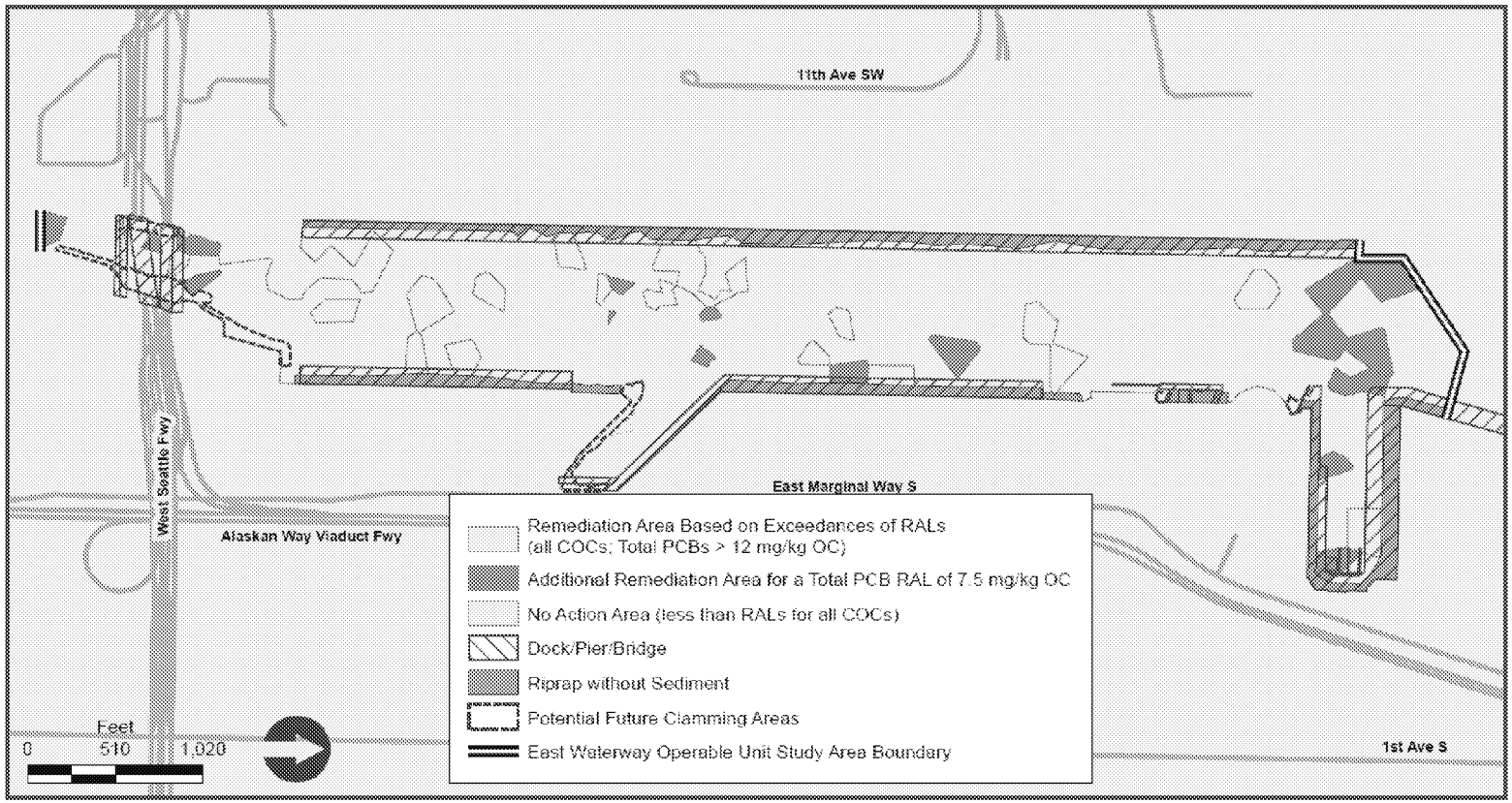
Risk Driver	PRG	RAO	Basis	Spatial Scale
Total PCBs	2 ug/kg dw	Protection of Human Health for Seafood Consumption (RAO 1)	Natural background	Site-wide
	250, 370 ug/kg dw	Protection of Fish (RAO 4)	RBTC – brown rockfish (250) and English sole (370)	Site-wide
	12 mg/kg OC (SQS)	Protection of the Benthic Community (RAO 3)	RBTC	Point
Arsenic (mg/kg dw)	7	Protection of Human Health for Direct Contact (RAO 2)	Natural background	Site-wide (Netfishing) and Clamming Areas
	57 (SQS)	Protection of the Benthic Community (RAO 3)	RBTC	Point
cPAH (µg TEQ/kg dw)	Undefined	Protection of Human Health for Seafood Consumption (RAO 1)	RBTC	Site-wide
	NA	Protection of Human Health for Direct Contact (RAO 2)	RBTC	Site-wide Clamming Areas
Dioxins/Furans (ng TEQ/kg dw)	2	Protection of Human Health for Seafood Consumption (RAO 1)	Natural background	Site-wide
TBT (mg/kg OC)	7.5	Protection of the Benthic Community (RAO 3)	RBTC	Point
Other benthic risk drivers	SQS	Protection of the Benthic Community (RAO 3)	RBTC	Point

RBTC – risk based threshold concentration NA – not applicable

Remedial Action Levels (RALs)

Risk Driver	RAL	Objectives Achieved
Total PCBs	12 or 7.5 mg/kg OC (site-wide)	Not expected to achieve natural background-based PRGs. RALs result in significant risk reduction.
Dioxins/Furans	25 ng TEQ/kg dw (site-wide)	Achieves benthic and ecological PCB PRGs.
Arsenic	57 mg/kg dw (site-wide)	Achieves benthic PRG. Achieves direct contact PRG at completion of construction but then rises back above over time
TBT	7.5 mg/kg OC (site-wide)	Achieves benthic PRG
1,4-Dichlorobenzene	SQS (benthic SCO; site-wide)	Achieves benthic PRG
Butyl benzyl phthalate		
Acenaphthene		
Fluoranthene		
Fluorene		
Mercury		
Phenanthrene		

Remediation Areas



- RALs applied to the upper 2 feet north of Spokane Street Bridge
- RALs result in remediating 121 acres (PCB RAL = 12 mg/kg OC) of 157 acres (132 acres with PCB RAL = 7.5 mg/kg OC)
- Remediates 77% to 84% of the Site

Components of the Remedial Alternatives

Open-water

1 – Removal with capping and ENR where applicable

2 – Removal with capping where applicable

3 – Maximum removal

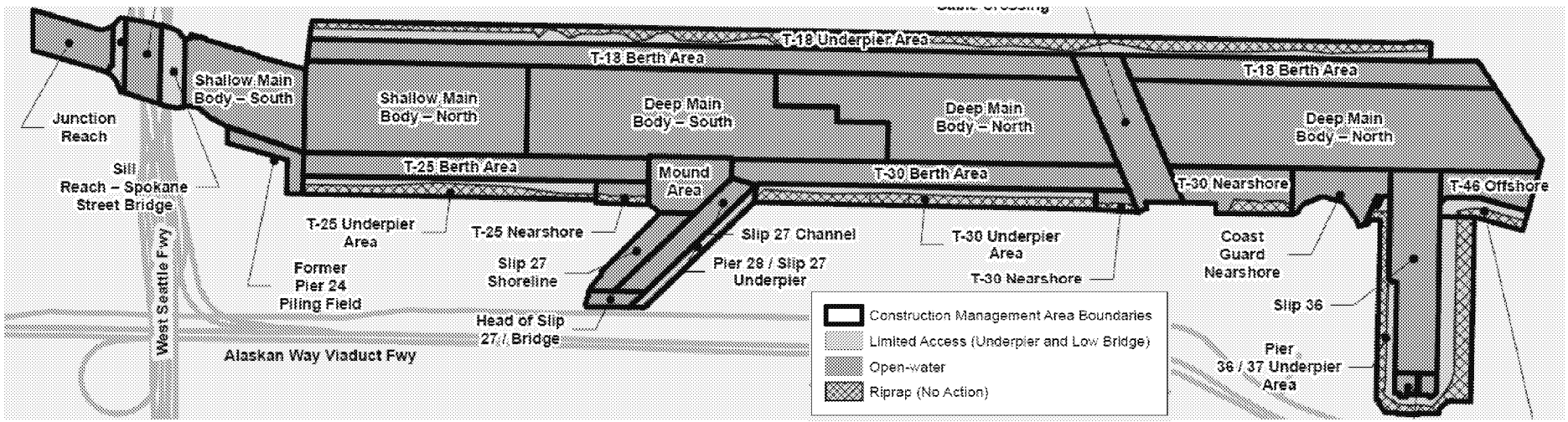
Underpier

A – MNR

B – In situ treatment

C+ – Diver-assisted hydraulic dredging ***followed by in situ treatment*** for PCBs or Hg > CSL; in situ treatment elsewhere exceeding RALs

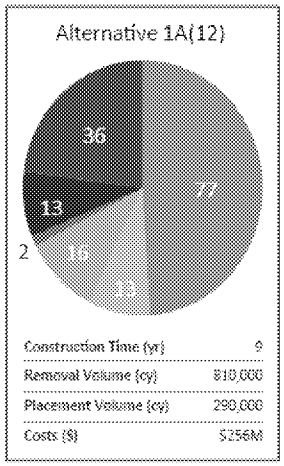
E – Diver-assisted hydraulic dredging followed by in situ treatment



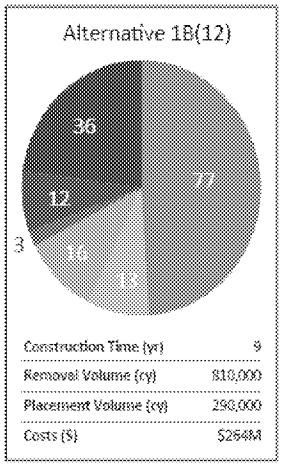
Retained Alternatives

Action Alternatives	Technologies for Open-water Areas	Technologies for Restricted Access Areas (Underpier and Low Bridges)	PCBs RAL All Areas
No Action			
1A(12)	1. Removal with capping and ENR where applicable	A MNR	12 mg/kg OC
1B(12)		B In situ treatment	
1C+(12)		C+ Diver-assisted hydraulic dredging followed by in situ treatment for PCBs or mercury > CSL; in situ treatment elsewhere	
2B(12)	2. Removal with capping where applicable	B In situ treatment	
2C+(12)		C+ Diver-assisted hydraulic dredging followed by in situ treatment for PCBs or mercury > CSL; in situ treatment elsewhere	
3B(12)	3. Maximum removal to the extent practicable	B In situ treatment	
3C+(12)		C+ Diver-assisted hydraulic dredging followed by in situ treatment for PCBs or mercury > CSL; in situ treatment elsewhere	
2C+(7.5)	2. Removal with capping and ENR where applicable		7.5 mg/kg OC
3E(7.5)	3. Maximum removal to the extent practicable	E Diver-assisted hydraulic dredging followed by in situ treatment	

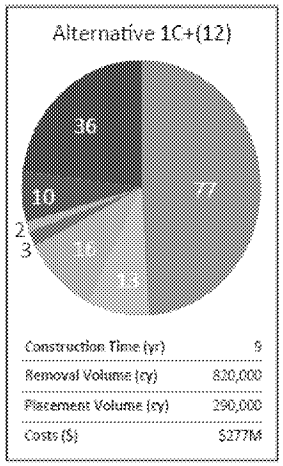
Remedial Alternatives



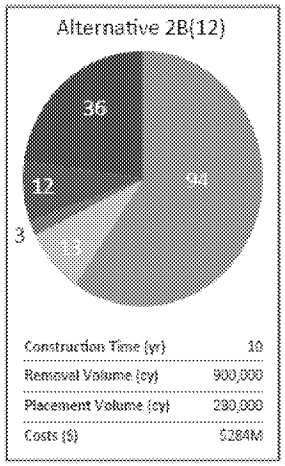
Construction Time (yr)	9
Removal Volume (cy)	810,000
Placement Volume (cy)	290,000
Costs ($)	$256M



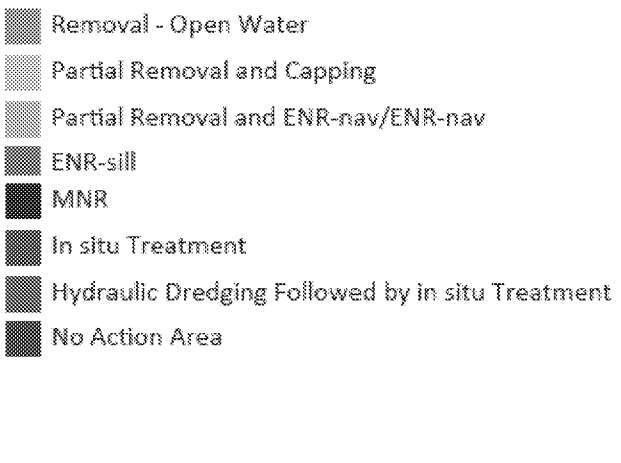
Construction Time (yr)	9
Removal Volume (cy)	810,000
Placement Volume (cy)	290,000
Costs ($)	$264M

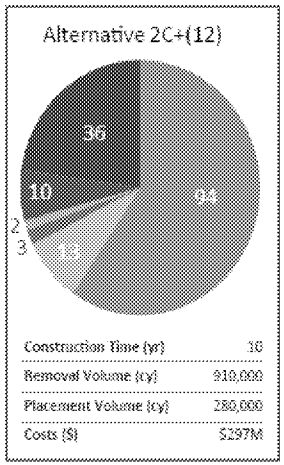


Construction Time (yr)	9
Removal Volume (cy)	820,000
Placement Volume (cy)	290,000
Costs ($)	$277M

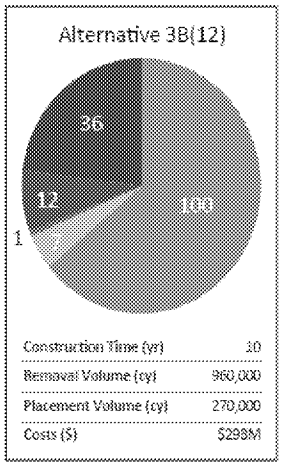


Construction Time (yr)	10
Removal Volume (cy)	900,000
Placement Volume (cy)	280,000
Costs ($)	$284M

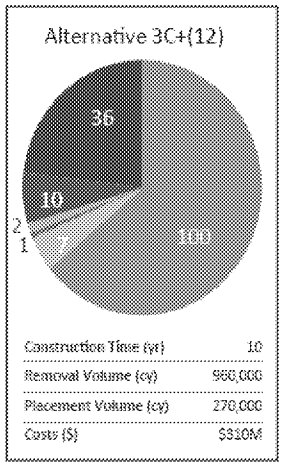




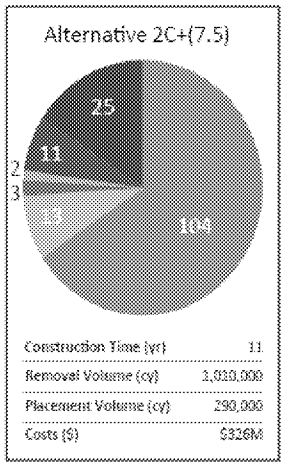
Construction Time (yr)	10
Removal Volume (cy)	910,000
Placement Volume (cy)	280,000
Costs ($)	$297M



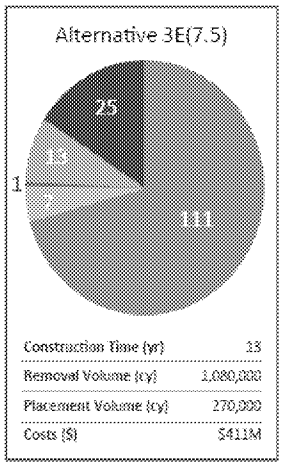
Construction Time (yr)	10
Removal Volume (cy)	960,000
Placement Volume (cy)	270,000
Costs ($)	$298M



Construction Time (yr)	10
Removal Volume (cy)	960,000
Placement Volume (cy)	270,000
Costs ($)	$310M



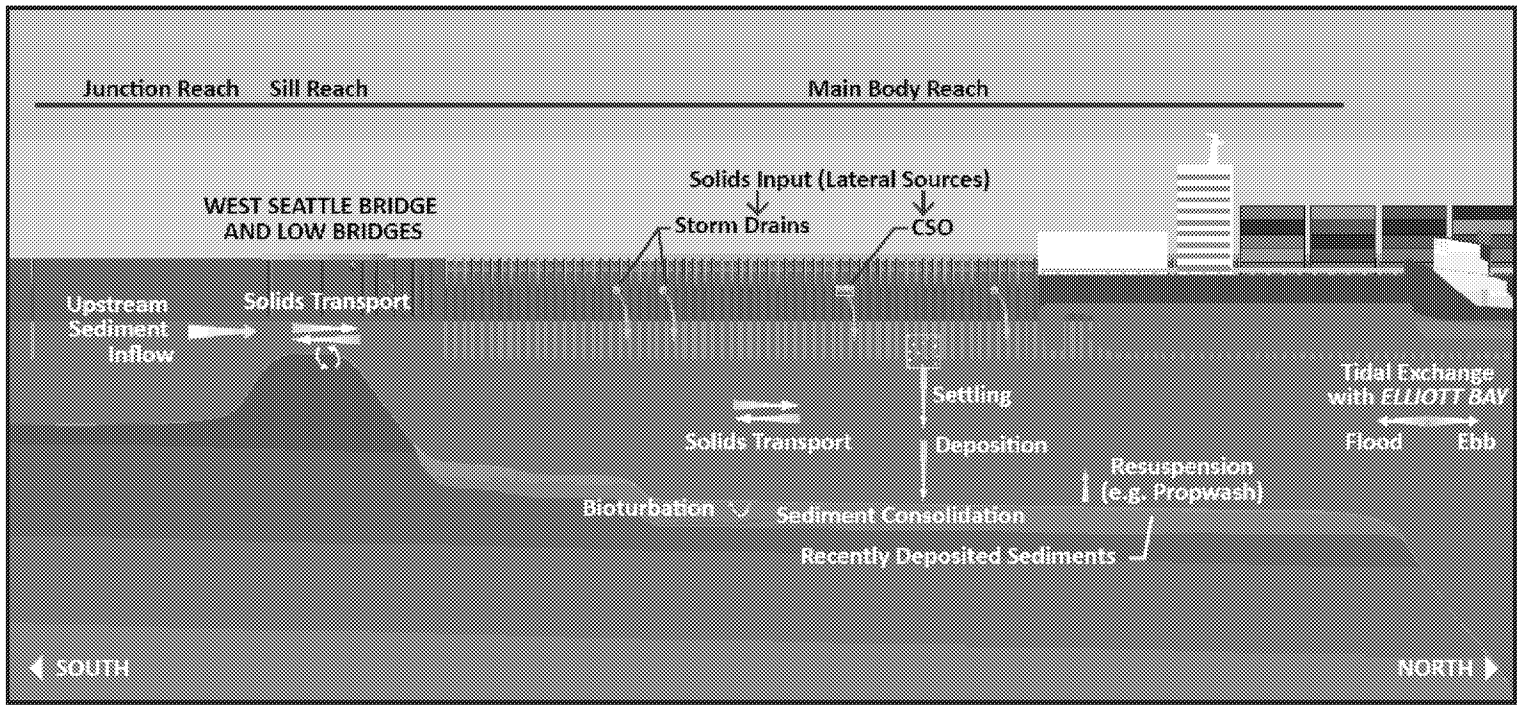
Construction Time (yr)	11
Removal Volume (cy)	1,010,000
Placement Volume (cy)	290,000
Costs ($)	$326M



Construction Time (yr)	13
Removal Volume (cy)	1,080,000
Placement Volume (cy)	270,000
Costs ($)	$411M

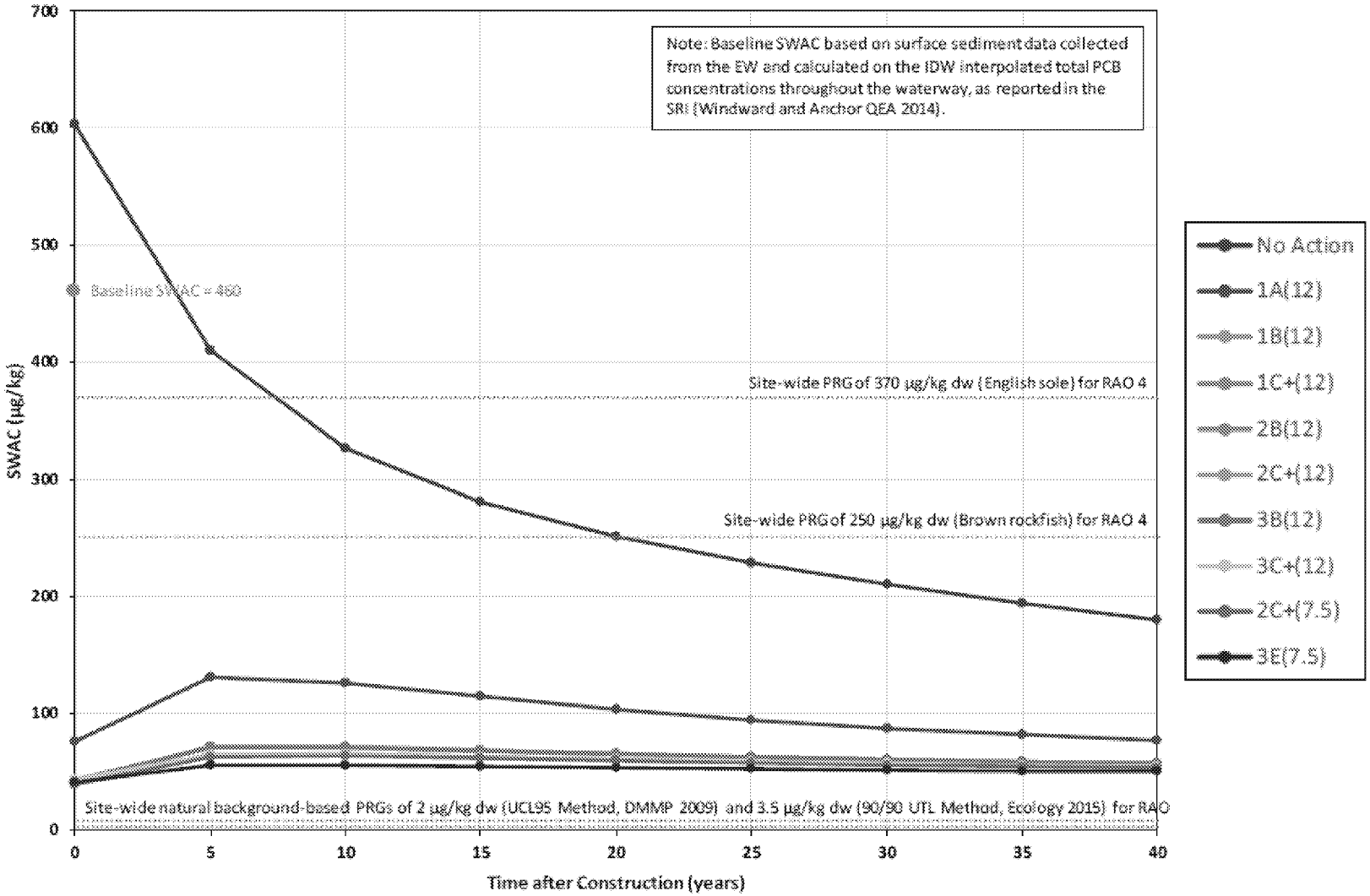
Numbers in pie chart represent acres; total sediment area is 157 acres

Chemical and Physical Modeling



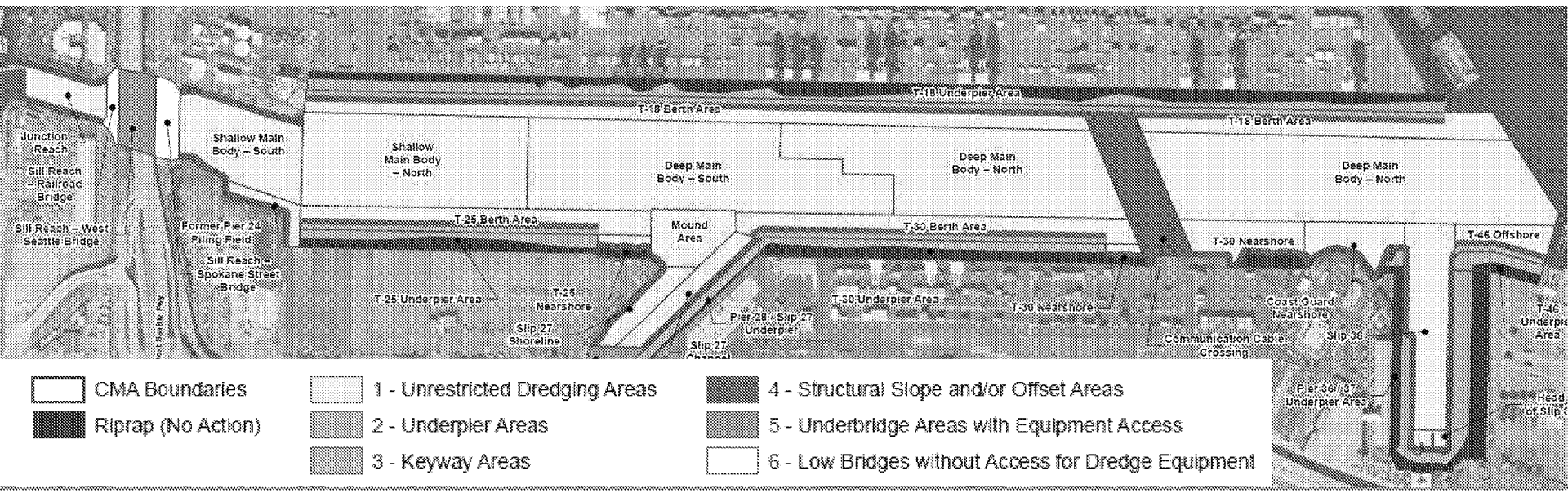
- Net depositional, with sedimentation rates from 0 to 4.2 cm/year
- Sediment load: 99% from the Green/Duwamish River
  - Less than 1% from the upstream LDW Superfund site
  - 0.2% to 0.3% originates from EW storm drains and CSOs
- Vessel propwash mixing – 0.5 to 2 ft depths

Predicted Site-wide SWAC for PCBs



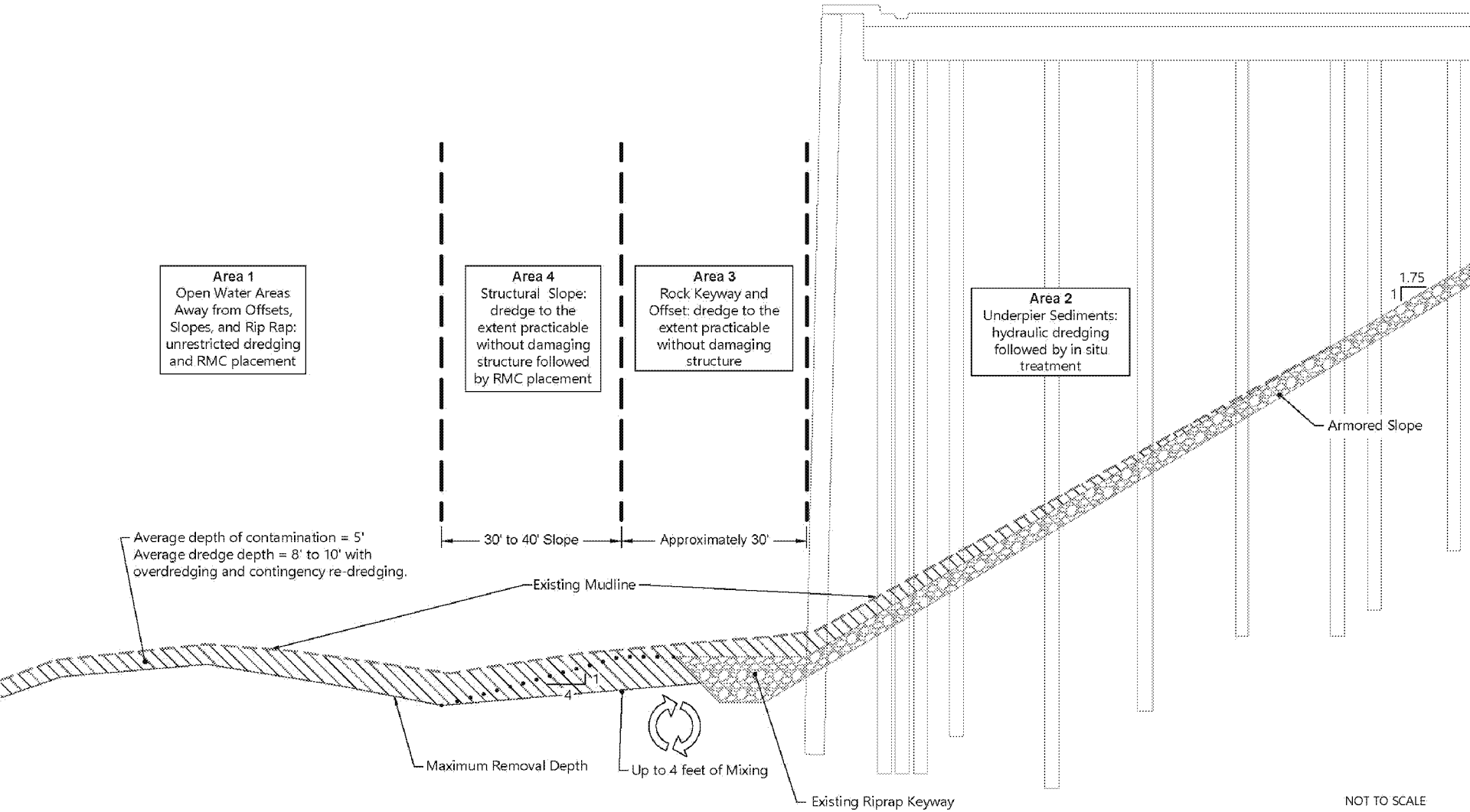
Natural Background is Not Attainable for PCBs, Arsenic and Dioxin/furan

- Incoming upstream concentrations
- Contaminated sediment left in place because it is impracticable to remove
- Mixing from vessels throughout construction and after
- Residuals from dredging



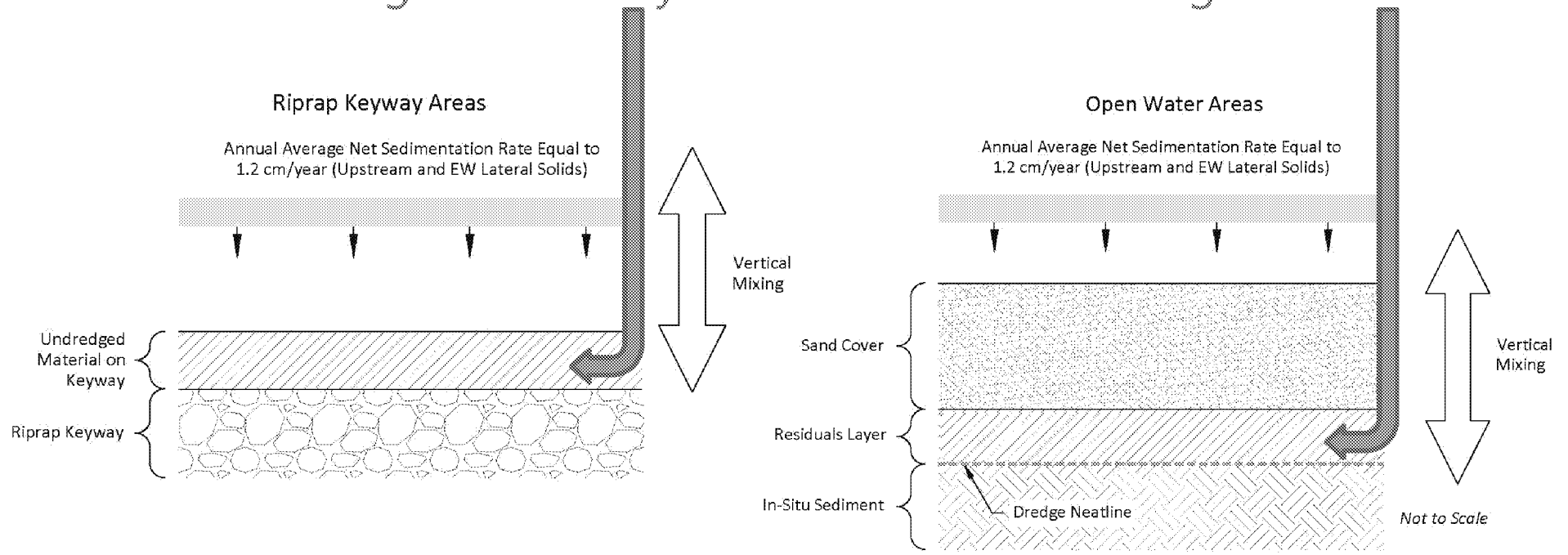
Maximum Possible Remediation Evaluation

Conceptual Cross Section



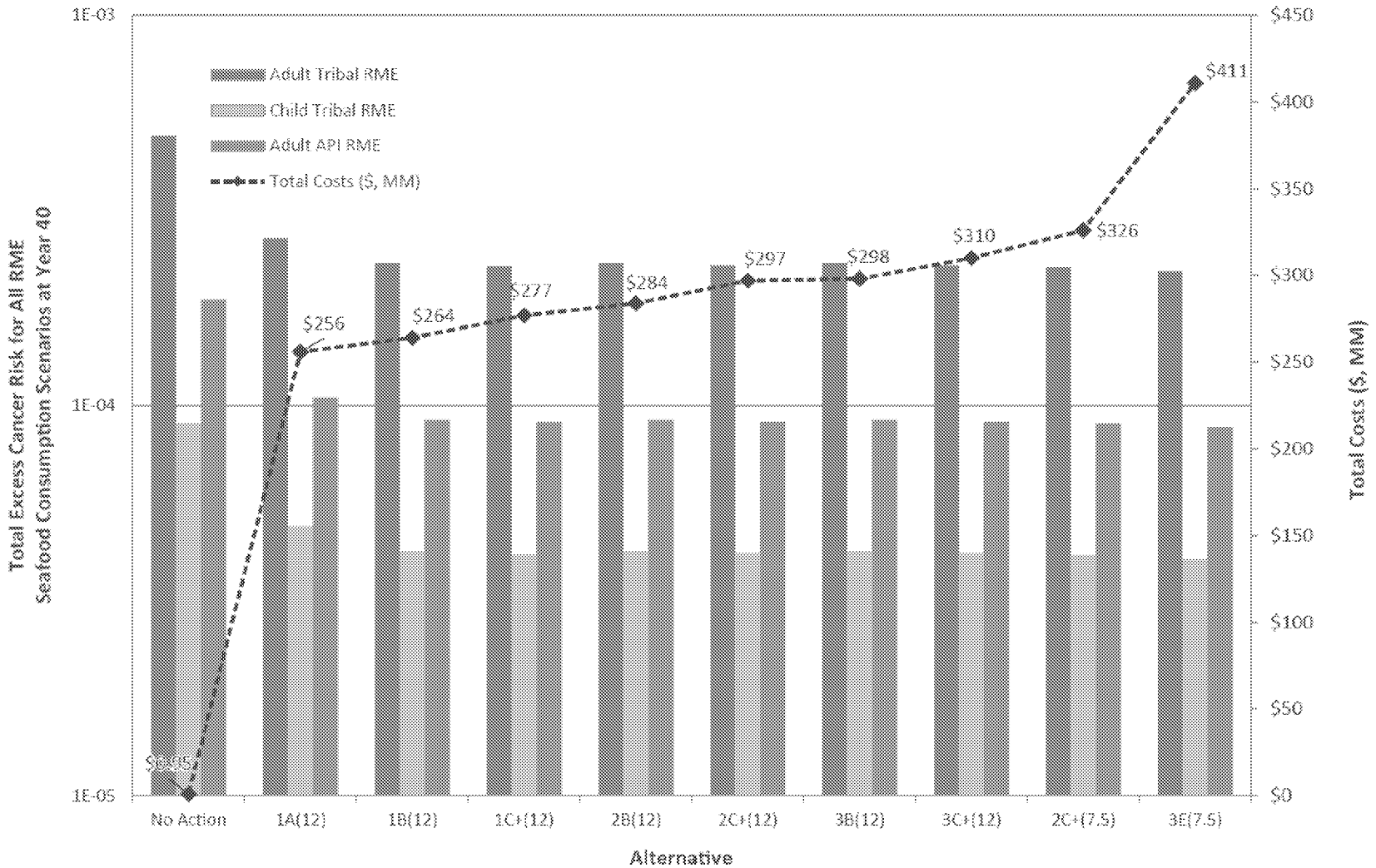
Attainable vs Anthropogenic Background

- Anthropogenic background includes
  - Upstream inputs
  - Controlled lateral inputs
- Anthropogenic background does not include
  - Undredged Inventory
  - Dredge Residuals



Long-Term Risks and Costs

FS Figure 11-4



EWG Activities

- May 2019: EPA Region 10 and EWG met to discuss how to reach a final remedy when there are unachievable standards
- June 2019: EPA Region 10 described their ideas for a final remedy, which differed substantially from what was communicated in person in May
- August 2019: Port and County sent letters to EPA Region 10 Regional Administrator, Chris Hladick, expressing concerns with EPA's stated approach

EWG Activities (cont.)

- December 2019: Port met with EPA HQ regarding Port proposal for EPA to waive unachievable standards
- January 2020: Port sent letter to EPA HQ to respond to EPA questions and to provide further rationale for a TI waiver
- February 2020: EPA Region 10 and HQ staff met with EWG to discuss EPA's options regarding natural background
- April 2020: Per EPA's request, EWG sent letter to EPA in response to February 2020 meeting

EWG Concerns with Natural Background PRG

- Retaining unachievable cleanup levels in ROD – even with a future adjustment to regional/anthropogenic background:
  - It misleads the public
    - The extensive cleanup is perceived as not complete
    - The remedy will be viewed as a failure because it will not come close to meeting the natural background cleanup levels
  - Creates uncertainty and unnecessary/protracted legal/regulatory process for decades

EWG Concerns with Adopting Anthropogenic Background at a Later Date

- What system will reach, what is achievable – needs to consider all factors
- EPA method for determining does not account for contamination that can't be remediated
- Undefined when/if it happens
  - The risks will fall to the public

Management of Natural Background Issue

- TI wavier would
  - Ensure public is aware of limitations of achieving background based cleanup standards at EW
  - Not affect the remedy to be selected by EPA
  - Not undermine the cleanup or the level of protection achieved
  - Ensure public investments go where they have the greatest environmental and public health benefit
  - Provide a clear estimate of the cost to achieve the cleanup goals
  - Facilitate a cleanup agreement

Wrap Up

- Goals today
  - To familiarize the FS alternatives and practical feasibility issues with meeting NB and AB cleanup levels
  - Keep Tribes informed of communications with EPA

Questions/Discussion